

REMARKS

Claims 1-36 are pending in the present application. In the Office Action mailed May 21, 2007, the Examiner rejected claims 1, 7, 9-11, 15, and 17 under 35 U.S.C. §102(b) as being anticipated by Bartlett et al. (USP 5,060,481) [hereinafter “Bartlett”]. The Examiner next rejected claims 2-5, 16, 26, 28, 31, 32, 35, and 36 under 35 U.S.C. §103(a) as being unpatentable over Bartlett et al. in view of Emeric et al. (US Pub. 2002/0148604). Claim 18 was rejected under 35 U.S.C. §103(a) as being unpatentable over Bartlett et al. in view of Chen (USP 5,782,095).

Claims 6, 8, 12-14, 19-25, 27, 29, 30, 33, and 34 were indicated as containing allowable subject matter. Such indication is appreciated.

The Examiner rejected claim 1 under 35 U.S.C. §102(b) as being unpatentable over Bartlett. Claim 1 has been amended to recite that the at least one heating element is configured to melt iced particles disposed within the sealed vessel that encloses the magnet.

Bartlett discloses a cryogenic refrigeration system that uses heaters to “control the recondensing capacity of the refrigeration system and to heat the at least one Joule-Thomson valve and other points to melt away contaminants that may freeze at such points.” *Bartlett*, Abstract. Specifically, Bartlett discloses melting contaminants that have frozen at the J-T valves within a cold box 12 that is outside the vacuum jacketed structure 11, which encloses the superconducting magnet 7. *See id.* at col. 4, lns. 41-48; col. 4, lns. 4-5.

Therefore, in contrast to the heating element called for in claim 1 that is configured to melt iced particles disposed within the sealed vessel that encloses the magnet, Bartlett discloses melting frozen contaminants that are outside the sealed vessel that encloses the magnet. Thus, Bartlett does not teach or suggest all elements of claim 1. As such, Applicant believes amended claim 1 to be allowable over the art of record, and respectfully requests withdrawal of the rejection of claim 1 and all claims dependent therefrom.

The Examiner also rejected claim 10 under 35 U.S.C. §102(b) as being anticipated by Bartlett. Applicant respectfully disagrees. Specifically, the Examiner stated that Bartlett discloses “an MR recondensor de-icing system comprising superconducting magnet in a bath of liquid coolant 13 in a sealed vessel 11” and “recondensor supply and delivery tubes (to and from compressors (Figure 2)).” *Office Action*, 05/21/07, pg. 2.

Figure 2 of Bartlett depicts the flow of refrigerant gas through the cryogenic recondensor 2. *See Bartlett*, Fig. 2; col. 3, lns. 23-26. According to Bartlett, “refrigerant gas enters a first stage compressor 14 inside the compressor section 10, where the gaseous refrigerant is compressed.” *Id.* at col. 3, lns. 27-30. The compressed gas then enters the second stage

compressor 16, where the gas is further compressed. *See id.* at col. 3, lns. 31-33. “This high pressure refrigerant gas then exits the compressor section 10 and flows to the cold box 12.” *Id.* at col. 3, lns. 33-35. Therefore, according to Bartlett, refrigerant enters the first compressor as a gas and exits the first compressor as a compressed gas. *See id.* at col. 3, lns. 27-30. The compressed gas is further compressed in the second compressor and exits the second compressor as a high pressure refrigerant gas. *See id.* at col. 3, lns. 31-35. As such, Bartlett only discloses that refrigerant gas and high pressure refrigerant gas run to and from the first and second stage compressors. In fact, the only point where the refrigerant is not in a purely gaseous phase within the recondenser tubing is after it exits the second J-T valve 32, where the refrigerant is a two phase fluid. *See id.* at col. 4, lns. 63-64. Purely liquid helium is only present in the system of Bartlett at two locations: as the pool of liquid cryogen 13 that surrounds the magnet 7 and as the droplets of liquid cryogen 14 that recondense on the recondensing surface 45. *See id.* at Figure 2; col. 3, lns. 16-22.

Claim 10 calls for a supply tube connected to the recondensor and configured to deliver gaseous coolant to the recondensor and a delivery tube connected to the recondensor and configured to remove liquid coolant from the recondensor. That is, claim 10 recites a supply tube that delivers a gas and a delivery tube that removes a liquid.

While Bartlett may disclose tubes running to and from the compressors, Bartlett does not disclose a supply tube that delivers a gas and a delivery tube that removes a liquid as claimed. As such, Bartlett does not teach or suggest that which is called for in claim 10. Accordingly, Applicant believes that claim 10 and the claims that depend therefrom are patentably distinct over the art of record, and requests that the rejections thereof be withdrawn.

Claim 17 was rejected by the Examiner under 35 U.S.C. §102(b) as being anticipated by Bartlett. While Applicant does not necessarily agree with the Examiner’s basis for the rejection, Applicant has nonetheless elected to amend claim 17 to incorporate the allowable subject matter of claim 21, in an effort to expedite prosecution. Applicant therefore believes that claim 17 and the claims dependent therefrom are patentably distinct over Bartlett and requests withdrawal of the rejections thereof.

The Examiner rejected claim 26 under 35 U.S.C. §103(a) as being unpatentable over Bartlett in view of Emeric. The Examiner stated that, while “Bartlett et al. do not teach a vacuum supply capable of removing particles from the condensing unit” it would have been obvious to one of ordinary skill in the art “to combine the vacuum pump of Emeric et al. to the system of Bartlett et al. for the purpose of controlling the overall pressure of the system.” *Office Action*, supra at pg. 3. Applicant respectfully disagrees.

As discussed above, Bartlett discloses a cryogenic refrigeration system including a cryogenic recondenser. *See Bartlett*, col. 1, lns. 45 and 65. The refrigeration system of Bartlett includes a bath of liquid cryogen 13 that is used to cool the MR magnet 7. *See id.* at col. 3, lns. 1-3. Boiled-off cryogen rises from the bath and comes into contact with recondensing surface 45, which absorbs the heat of the vaporous cryogen and recondenses the cryogen. *See id.* at col. 3, lns. 15-22. The recondensing surface 45 is cooled via a cryogenic recondenser 2. *See id.* at col. 4, lns. 66-68 through col. 5, lns. 1-8. Within the recondenser 2 is a cold box 12, which includes a series of heaters (31, 33, 36), valves (30, 32, 34, 60), a G-M refrigerator 36, and a compressor section 10. *See id.* at Figure 2. As the refrigerant gas travels through the cold box 12 and compressor section 10, the gas is compressed to specific high pressure levels. *See, e.g., id.* at col. 3, lns. 23-56. Specifically, Bartlett states that “the pressure of the refrigerant gas is a primary determinant of refrigerative capacity.” *See id.* at col. 3, lns. 43-45.

In addition to closely regulating the pressure of the refrigeration system, Bartlett also closely monitors temperature within the recondenser 2. Joule-Thomson valves are used within the system to further cool the gaseous refrigerant. Bartlett discloses that the flow areas to the J-T valves “are set at very small dimensions due to the low mass flow, the high pressure and the low temperature of the of the working refrigerant gas.” *Id.* at col. 4, lns. 38-41. Heaters are located to melt any contaminant gases that freeze at the J-T valves (*see id.* at col. 4, lns. 45-47) and are “selectively turned on as a function of time and system temperatures” (*id.* at col. 8, lns. 60-61).

Emeric discloses a method and system of regulating cooling of a MR device. *Emeric*, Title. Emeric uses a vacuum pump 78 that is disposed within a vacuum chamber 74 to “frequently expunge any air and/or moisture in the vacuum chamber 74 by maintaining a vacuum condition.” *Emeric*, col. 4, ¶31.

Combining Bartlett and Emeric would result in a system that applied an external vacuum pressure to the recondenser of Bartlett. Based on fundamental thermodynamic principles, the externally applied vacuum would significantly alter the mass flow rate, pressure, and temperature of the refrigerant gas within the recondenser system, and likely significantly raise the temperature of the recondenser surface 45 of Bartlett. At heightened temperatures, the recondenser surface 45 would no longer cause evaporated coolant to liquefy, thus making Bartlett inoperable for its intended purpose. Thus, it is unclear how the Examiner proposes to operably incorporate the system of Emeric into the system of Bartlett without making Bartlett inoperable and without relying on improper hindsight. *See* MPEP §2143.01 (“the proposed modification cannot render the prior art unsatisfactory for its intended purpose”). Therefore, Applicant believes that there is no motivation to combine the art of record and that a combination of the art of record does not

teach all of the elements of claim 26. Accordingly, Applicant respectfully requests withdrawal of the rejection of claim 26 and all claims depending therefrom.

Applicant has amended claim 33 to more clearly define the invention.

In addition to the above amendments and remarks, Applicant has newly added independent claim 37, which incorporates the allowable subject matter of claim 18 written in independent form, and is thus believed to be in condition for allowance. Newly added dependent claim 38 incorporates the allowable subject matter of claim 19. Claim 21 has been canceled.

Therefore, in light of at least the foregoing, Applicant respectfully believes that the present application is in condition for allowance. As a result, Applicant respectfully requests timely issuance of a Notice of Allowance for claims 1-20 and 22-38.

A fee in the amount of \$750.00 is concurrently being paid via EFS-Web for fees associated with entering the claims newly presented herein.

Applicant appreciates the Examiner's consideration of these Amendments and Remarks and cordially invites the Examiner to call the undersigned, should the Examiner consider any matters unresolved.

Respectfully submitted,

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General Authorization and Extension of Time

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 07-0845. Should no proper payment be enclosed herewith, as by credit card authorization being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 07-0845. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extensions under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 07-0845. Please consider this a general authorization to charge any fee that is due in this case, if not otherwise timely paid, to Deposit Account No. 07-0845.

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